

Application of the ESR spectrometry to evaluate the original dose in irradiated dried fruit

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The identification of irradiated dried fruit can be achieved by means of the electron spin resonance (ESR) spectrometry, as recommended by the European Community, since ionizing radiation induces free radicals in cellulose, a constituent of the shell. The aim of this work was to use the ESR spectrometry also as a quantitative procedure to evaluate the original dose in irradiated dried fruits, using the additive dose method. Little shell pieces, taken from nuts, chestnuts, peanuts and pistachios, were irradiated at "original" dose values in the range 1 to 8 kGy, and the ESR signal intensity was measured. Each specimen was then reirradiated with added doses of 1 kGy, and the ESR signal was measured afterwards. The mathematical relationship between the ESR signal intensity and the added dose was found; back extrapolation to the dose axis gives an estimation of the original dose. Our results show that the method gives an estimation of the original dose within $\pm 30\%$. An investigation on the time stability of the ESR signal was carried out: the signal intensity decreases during the first days after irradiation, and remains almost steady afterwards. A procedure was therefore developed to take into account this signal fading when dose reconstruction is performed with the additive dose method.